

Mullineaux Enterprises, LLC
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July 9, 2021

U. S. Department of Transportation

Docket Management System

1200 New Jersey Ave., SE,

West Building Ground Floor, Room W12-140, Washington, DC 20590

Request for Exemption under Part 11 of the Federal Aviation Regulations from 14 C.F.R. 107.36, 14 C.F.R. 137.19(c), 14 C.F.R. 137.19(d), 14 C.F.R. 137.19(e)(2)(ii), 14 C.F.R. 137.19(e)(2) (iii), 14 C.F.R. 137.19(e)(2)(v), 14 C.F.R. 137.31(a), 14 C.F.R. 137.31(b), 14 C.F.R. 137.33(a), 14 C.F.R. 137.33(b), 14 C.F.R. 137.41(c), 14 CFR § 137.41(c), 14 C.F.R. 137.42, and 49 C.F.R. 175.9(b)(1).

To whom it may concern:

Mullineaux Enterprises, LLC, an operator of Small Unmanned Aircraft Systems (sUAS) hereby applies for an exemption from certain provisions of 14 C.F.R. 107, 14 C.F.R. 137, and 49 C.F.R. 175 to operate an unmanned aircraft system (UAS) for commercial agricultural-related services. The relief requested is similar to that granted in Exemption No. 11448 to Yamaha Motor Corporation, USA. However, Mullineaux Enterprises, LLC, intends to operate a sUAS over the 55 pound limit of 14 C.F.R. 107. Mullineaux Enterprises, LLC, does not require the extensive operating exemptions and limitations contained in Exemption 11448 granted pursuant to Section

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333 because Mullineaux Enterprises, LLC, will be operating within the parameters of 14 C.F.R.

107.

Mullineaux Enterprises, LLC, asks the FAA to grant its petition because granting the exemption will not adversely affect safety because the exemption will provide a level of safety at least equal to the existing rules.

Petitioner's Contact Info:

Mullineaux Enterprises, LLC

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Regulations from which exemption is requested:

- *14 C.F.R. 107.36, Carriage of Hazardous Material*
- *14 C.F.R. 137.19(c), Certification Requirements, Commercial Operator - pilots*
- *14 C.F.R. 137.19(d), Certification Requirements; Aircraft*
- *14 C.F.R. 137.19(e)(2)(ii), Certification Requirements; Knowledge and skill tests; skills; approaches to the working area.*

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14 C.F.R. 137.19(e)(2) (iii), Certification Requirements; Knowledge and skill tests; skills;

flare-outs

● *14 C.F.R. 137.19(e)(2)(v); Certification Requirements; Knowledge and skill tests; skills;*

pullups and turnarounds

● *14 C.F.R. 137.31(a), Aircraft Requirements; Certification Requirements*

● *14 C.F.R. 137.31(b) Shoulder Harnesses*

● *14 C.F.R. 137.33(a), Carrying of certificate; Certificate carried on the aircraft.*

● *14 C.F.R. 137.33(b) Registration and airworthiness certificates available.*

● *14 C.F.R. 137.41(c), Personnel; Pilot in Command; Commercial certificate*

● *14 CFR § 137.41(c), Personnel; Pilot in command; demonstration of knowledge and skills.*

● *14 C.F.R. 137.42, Fastening of safety belts and shoulder harnesses.*

● *49 C.F.R. 175.9(b)(1), Special Aircraft Operations; Exceptions; Agricultural Operations*

● *49 USC 44807, Special authority for certain unmanned aircraft systems*

Business Model

Mullineaux Enterprises, LLC offers growers a variety of services through the use of the UAS including but not limited to fertilizing and planting. The bulk of our work is done through fertilizing using liquid over standing crops. The use of the UAS allows growers to increase their

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maximum potential yield by not having to run through the crop with a grounded machine and

potentially destroy standing plants.

DJI T20 Specifications

Aircraft Frame

Diagonal Wheelbase 1883 mm

Dimensions 2509×2213×732 mm Arms & Propeller unfolded

1795×1510×732 mm Arms Unfolded and Propellers Folded

1100×570×732 mm Arms and Propellers Folded

Dynamical system- motor

Stator size 100x15mm

KV value 75rpm/V

Maximum Thrust 13.5kg/rotor

Maximum Power 2400w/rotor

Weight 666 g

ESCs

Max Working Current 40 A

Max Working Voltage 58.8 V

Foldable Propellers (R3390)

Diameter x Pitch 33x9 in

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Weight (Single propeller) 90 g

Spraying System

Spray Tank

Volume Full: 20 L

Operating Payload Full: 20 kg

Nozzles

Model XR11001VS

Quantity 8

Max Spray Rate XR11001VS: 3.6L/min

Spray Width 4-7m (8 nozzles, at a height of 2-3 m above crops)

Flow Meter

Measurement Range 0.25 - 20 L/min

Error <+/-2%

Measurable Liquid Conductivity > 50 μ S/cm (Liquids such as tap water or pesticides that contain water)

Omnidirectional Digital Radar

Model RD2428R

Operating Frequency CE/ FCC/ NCC: 24.05 - 24.25 GHz, MIC/ KCC: 24.05 - 24.25 GHz

Transmitter Power (EIRP) MIC/ KCC/ CE/ FCC/ NCC: < 20 dBm

Power Consumption 18 W

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Altitude Detection and Terrain Follow Altitude detection range: 1 - 30 m, Stabilization
working range: 1.5 - 15 m, Max slope in mountain mode: 35 degrees

Obstacle Avoidance System Obstacle sensing range: 1.5 - 30 m, FOV: Horizontal: 360
degrees, Vertical: $\pm 15^\circ$, Working conditions: Flying higher than 1.5 m over the surface below at a
speed lower than 7 m/s, Safety distance: 2.5 m (Distance between the front of propellers and the
obstacle after braking), Obstacle avoidance direction: Omnidirectional obstacle avoidance in the
horizontal direction

IP Rating IP67

FPV Camera

FOV Horizontal: 98° , Vertical: 78°

Resolution 1280×960 30fps

FPV Spotlight FOV: 110° , Max brightness: 12 lux at 5 m of direct light

Flight Parameters

OcuSync 2.0 Operating Frequency CE / MIC / KCC / FCC / NCC / SRRC: 2.4000 - 2.4835
GHz FCC / NCC / SRRC: 5.725 - 5.850 GHz

OcuSync 2.0 Transmitter Power (EIRP) 2.4 GHz, SRRC / CE / MIC / KCC: 18.5 dBm, FCC /
NCC: 25.5 dBm, 5.8 GHz, SRRC / FCC / NCC: 25.5 dBm

Total Weight (Excluding battery) 21.1 kg

Max Takeoff Weight 47.5 kg (At sea level)

Max Thrust-Weight Ratio 1.70 (Takeoff weight of 47.5 kg)

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Hovering Accuracy Range (With strong GNSS signal) D-RTK enabled: Horizontal: ± 10 cm, Vertical: ± 10 cm, D-RTK disabled: Horizontal: ± 0.6 m, Vertical: ± 0.3 m (Radar module enabled: ± 0.1 m)

RTK / GNSS Operating Frequency RTK: GPS L1/L2, GLONASS F1/F2, BeiDou B1/B2, Galileo E1/E5[3] GNSS: GPS L1, GLONASS F1, Galileo E1[3]

Battery DJI-approved flight battery (AB3-18000mAh-51.8V)

Max Power Consumption 8300 W

Hovering Power Consumption 6200 W (Takeoff weight of 47.5 kg)

Hovering Time 15 min (Takeoff weight of 27.5 kg with an 18000 mAh battery) 10 min (Takeoff weight of 42.6 kg with an 18000 mAh battery)

Max Tilt Angle 15°

Max Operating Speed 7 m/s

Max Flying Speed 10 m/s (With a strong GNSS signal)

Max Wind Resistance 8 m/s

Max Service Ceiling Above Sea Level 2000 m

Recommended Operating Temperature 0° to 40° C (32° to 104° F)

Remote Controller

Model RM500-AG

Screen 5.5-inch screen, 1920×1080 , 1000 cd/m², Android system

RAM 4 GB LPDDR4

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ROM 32 GB + scalable storage; microSD cards supported; Max Capacity: 128 GB. UHS-I
Speed Grade 3 rating required

Built-in Battery 18650 Li-ion (5000 mAh @ 7.2 V)

GNSS GPS+GLONASS

Power Consumption 18 W

Operating Temperature -10° to 40° C (14° to 104° F)

Charging Temperature 5° to 40° C (40° to 104° F)

Storage Temperature -30° to 25° C (-22° to 77° F)

OcuSync 2.0

Operating Frequency CE / MIC / KCC / FCC / NCC / SRRC: 2.4000 - 2.4835 GHz FCC /
NCC / SRRC: 5.725 - 5.850 GHz

Max Transmission Distance Transmitter Power (EIRP) FCC / NCC: 5 km, SRRC / MIC/ KCC
/ CE: 3 km (Unobstructed, free of interference) 2.4 GHz

SRRC / CE / MIC / KCC: 18.5 dBm, FCC / NCC: 25.5 dBm 5.8 GHz

SRRC / FCC / NCC: 25.5 dBm

Wi-Fi

Protocol Wi-Fi Direct, Wi-Fi Display, 802.11a/g/n/ac Wi-Fi with 2×2 MIMO is supported

Operating Frequency 2.4000 - 2.4835 GHz 5.150 - 5.250 GHz 5.725 - 5.850 GHz

Transmitter Power (EIRP) 2.4 GHz

SRRC / CE: 18.5 dBm, FCC / NCC / MIC / KCC: 20.5 dBm 5.2 GHz

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SRRC / FCC / NCC / CE / MIC: 14 dBm, KCC: 10 dBm 5.8 GHz

SRRC / FCC / NCC: 18 dBm, CE / KCC: 12 dBm

Bluetooth

Protocol Bluetooth 4.2

Operating Frequency 2.4000 - 2.4835 GHz

Transmitter Power (EIRP) SRRC / FCC / NCC / CE / MIC / KCC: 6.5 dBm

All above information taken from the DJI AGRAS T20 Quick Start Guide

Examples of Risks and Solutions

Risk: UAS Lost Signal, UAS Low Battery, UAS Lost Visual Line of Sight.

a. Solution: In the T20, Mullineaux Enterprises, LLC utilizes DJI MG App 2.0, the software programming come with the flight controller, which has a Return to Land (RTL) option that will navigate the UAV to a certain RTL altitude, then move the UAV to the location of takeoff, unless shown a new home location by the PIC. The UAV control is then returned to the pilot to land.

RTL comes into play in the case of:

i. Lost RC signal.

ii. Low battery.

iii. RTL can be activated at any point by the pilot, such as loss of visual line

of sight or loss of control of the UAV by the pilot.

b. Solution: In the T20, Mullineaux Enterprises, LLC uses a DJI App built into the flight controller that has the same features as those above for the T20.

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Risk: Flight over unwanted area.

a. Solution: Mullineaux Enterprises, LLC use of DJI App 2.0 and mission planning software called DJI App 2.0 Mission Planner permits it to create geofenced areas that prohibit flight paths over unwanted areas. Moreover, the UA will remain in VLOS. The operator will manually control the UAS to avoid flight over unwanted areas.

Risk: UAS Flyaway.

a. Solution: The flights are conducted in areas that are extremely remote and all persons in the area are under the control of Mullineaux Enterprises, LLC. The flight time of the UAS alleviates the risk by flyaway to more populated areas.

Risk: Inclement weather.

a. Solution: Mullineaux Enterprises, LLC flies a UAV body that has a weatherproof housing and weatherproofing measures for the electronic speed controllers. This provides some protection and allows us to fly under light rain. In the event of a quick downpour, this housing allows the operator to return the aircraft home, or quickly land it, before systems begin to fail.

Risk: Software error causes operational issues.

a. Solution: The navigational and flight control equipment are OEM components from large equipment manufacturers (DJI), selected for being common, well-supported, and safe due to the millions of hours of testing by the manufacturers and iterative improvements caused by users in the field reporting errors (as opposed to being purchased from companies that are selling prototype and initial-run units prone to manufacturing and engineering problems).

Risk: Malfunction of spraying equipment (nozzles, pumps, tubing) causes spray of target that should not be sprayed.

a. Solution: TeeJet spray nozzles are a common or standard nozzle for

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agricultural spraying operations. Teejet manufactures nozzles for precision applications, irrigation lines, backpack sprayers, and other ground-based pesticide and fertilizer applications. The aircraft will use 8 flat-fan-pattern nozzles that produce a straight fourteen-feet wide swath when sprayed from 3 feet above a target. TeeJet markets these nozzles for irrigation booms that are usually vehicle/tractor mounted. These nozzles have the capabilities to work with their precision spray systems which identify and spray targets as the vehicle moves along the ground. The quick-change nozzle set-up allows us to swap nozzles if the chemical mix, target composition, or environmental conditions dictates using different nozzles.

Risk: Inability to see target causes spraying of targets that should not be sprayed.

a. Solution: Mullineaux Enterprises, LLC has a downward-facing, high-resolution camera that allows either the PIC or an assistant to view the target over which the drone is hovering. This equipment has a long range, allowing Mullineaux Enterprises, LLC pilots to be precise in their application, even at great distance.

UAS Related Exemptions Requested:

- 14 C.F.R. 107.36, Carriage of Hazardous Material
- 49 C.F.R. 175.9(b)(1), Special Aircraft Operations; Exceptions; Agricultural Operations
- 14 CFR 137.19(d), Certification Requirements; Aircraft
- 14 CFR 137.31(a), Aircraft Requirements; Certification Requirements
- 49 USC 44807, Special authority for certain unmanned aircraft systems

A. 14 C.F.R. 107.36, Carriage of Hazardous Material

Part 107.36 of Chapter 14 prohibits the “Carriage of Hazardous Material” by a small unmanned aircraft. The Petitioner believes that this provision does not apply to it’s intended operations because holding fertilizer in tanks for aerial spraying does not constitute the “carriage of

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hazardous material” as stated by Part 107, Part 137, or Subchapter C of Chapter 49. The Petitioner requests either (1) an exemption from 14 C.F.R. 107.36; (2) a finding that no exemption is required; and/or (3) an exemption from 49 C.F.R. 175.9 as explained below

Part 107.36 reads as follows: “A small unmanned aircraft may not carry hazardous material.” For purposes of this section, the term hazardous material is defined in 49 CFR 171.8.” Section 175.9 of Chapter 49, Special Aircraft Operations, explains that the prohibition against carrying hazardous materials does not apply to hazardous materials “loaded and carried in hoppers or tanks of aircraft certificated for use in aerial seeding, dusting spraying, fertilizing, crop improvement, or pest control, to be dispensed during such an operation.” (emphasis added).

B. 49 C.F.R. 175.9(b)(1), Special Aircraft Operations; Exceptions; Agricultural Operations

The Petitioner requests an exemption from the requirement in 175.9 that aircraft be certificated in order to be excluded from the prohibition on carrying hazardous materials because the Petitioner’s UAS is not “an aircraft certified for [agricultural] use.” For all of the reasons stated in 14 C.F.R. 107, the rulemaking discussion thereof, in AC 107-2, and within this Petition, the Petitioner can achieve an equal level of safety to a certified aircraft when carrying fertilizer in tanks. There will be no one on board, the aircraft will be flying in remote areas all of the time, will be required to have a pre-flight inspection, and will be operated in compliance with Part 107.

C. 14 C.F.R. 137.19(d), Certification Requirements; Aircraft

Because the sUAS is not certificated, the Petitioner requests an exemption from 14 CFR 137.19(d). The UAS components have a proven operational and have design safety features such that operations conducted under the requirements of this exemption will not impact safety. Although relief from the requirement for the aircraft to be certificated is requested, prior to take-off, the aircraft will be in a condition for a safe flight in accordance with the provisions of Part 107.

D. 14 CFR 137.31(a), Aircraft Requirements; Certification Requirements

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The regulatory requirement of Part 137.31(a) is the same as that for 137.91. The relief requested, and justification are identical.

E. 49 USC 44807, Special authority for certain unmanned aircraft systems

We are looking for exemption to the under 55-pound regulation. The DJI T-20 Agricultural UAS standard takeoff weight is 42.6kg.

We have outlined in this document the requirement to meet this exemption.

F. UAS Pilot in Command (PIC)

All of the Petitioner's UAS pilots will hold Remote Pilot Certifications (Part 107 of the Federal Aviation Regulations). The petitioner is requesting an exemption from the requirement 14 C.F.R. 137.19(c) that at least one person have a current U.S. commercial or airline transport pilot certificate and who is rated for the aircraft to be used.

The Petitioner has integrated safety elements into the operation of its UAS including comprehensive pilot and visual observer (spotter) training. These requirements include: a comprehensive UAV training course which includes theory and practical components, a pilot theory exam, supervised Mullineaux Enterprises, LLC, training program requirements including examination, minimum flight time requirements, and demonstrated practical flying ability for the relevant tasks. These requirements provide an equal amount of safety to the requirements for receiving a Commercial certificate.

The Petitioner's team is made up of individuals with experience in company safety, aviation, and in companies with a culture of safety.

PIC Related Exemptions Requested

- 14 C.F.R. 137.19(c), Certification Requirements, Commercial Operator - pilots
- 14 C.F.R. 137.41(c), Personnel; Pilot in Command; Commercial

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A. 14 C.F.R. 137.19(c), Certification Requirements, Commercial Operator - pilots.

The Part 107 certificate is meant to allow commercial UAS operations and replace the need for a commercial certificate under Part 61 when conducting commercial operations. As explained, the Petitioner is, through its own training program, requiring experience and training beyond that is required by Part 107 in order to safely operate equally to what would be achieved employing operators with commercial certificates under Part 61.

The Petitioner will demonstrate the applicable practical skills required by Part 137 prior to conducting agricultural operations.

The following comparison between the commercial pilot requirements contained in Part 61 and the requirements contained in Part 107 demonstrates why the petitioner should be exempt from the parts of Part 137 that require possession of a Part 61 commercial certificate. Part 61.123 requires Commercial pilots to be at least 18 years old and able to have a level of English competency. Mullineaux Enterprises, LLC, will require its pilots to be at least 18 years old. English competency is required by Part 107.

Section 127 of Part 61 contains flight proficiency requirements for specific aircraft categories. Part 107 contains no flight proficiency requirements. Mullineaux Enterprises, LLC requires flight proficiency as part of their training program and examination. Section 129 of Part 61 contains requirements for aeronautical experience. Mullineaux Enterprises, LLC will require its pilots to log a certain number of supervised flight hours. Many of the requirements of section 129 do not apply or are excessive for Mullineaux Enterprises, LLC. Some flight time requirements in Part 61 are “cross-country time” or “instrument time”. There is no need for Part 107 remote pilots to complete time in cross-country flight or instrument flight. Mullineaux Enterprises, LLC pilots will spend all of their time flying the aircraft that they will be using. These unmanned aircraft are much less complicated than manned aircraft. The pilots can achieve a comparable level of experience and safety by requiring 20 hours of total flight time using the unmanned aircraft that will be used during operations. In conclusion, the FAA’s own “Analysis of Risk” in the Rulemaking discussion for Part 107 explains perfectly why Mullineaux

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Enterprises, LLC, should be exempted from the requirement contained in Part 137 that pilots conducting agricultural operations obtain certifications under Part 61.

Much of the aeronautical experience/flight training is not applicable to small UAS operations because a small UAS is run differently than a manned aircraft. Requiring persons wanting to run a small UAS to obtain a pilot certificate under part 61 imposes the cost of airman certification on those persons, but does not result in a safety benefit because the process of obtaining the certificate does not equip those persons with all of the tools to alleviate the risk posed by small UAS operations.

The FAA should exempt the Petitioner from the requirement contained in 14 C.F.R. 137.19(c) that at least one person have a current U.S. commercial or airline transport pilot certificate and who is rated for the aircraft to be used.

B. 14 CFR 137.41 (c), Personnel; Pilot in Command; Commercial

3. UAS Operating Parameters

Mullineaux Enterprises, LLC's process will be to visit a site and review the terrain and vantage points. Then, all paperwork at the state and local level will be filed before and after operations. Mullineaux Enterprises, LLC will comply with all state laws regarding the application of fertilizer.

Once onsite, the flying will be conducted by a Mullineaux Enterprises, LLC pilot holding a Remote Pilot Certificate pursuant to FAR Part 107 with a visual observer. The pilot will keep the drone within line-of-site as per Part 107 rules. The observer will monitor the drone through line of sight.

The flying location:

The sites are extremely remote. The initial customers will be growers located in the rural areas of Maryland, Virginia, North Carolina, Delaware, West Virginia, and Pennsylvania but the plan is to

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expand to many other states. There will be a ladder and binoculars available to the visual observer to maintain an optimal line of site. When there are multiple pilots on site, there will be use of a CB Radio. The Petitioner will comply with 14 CFR 107.

UAS Operating Parameter Related Exemptions Requested:

- 14 CFR § 137.19(e)(2)(ii), Certification Requirements; Knowledge and skill tests; skills; approaches to the working area
- 14 CFR § 137.19(e)(2) (iii), Certification Requirements; Knowledge and skill tests; skills; flare-outs
- 14 CFR § 137.19(e)(2)(v); Certification Requirements; Knowledge and skill tests; skills; pullups and turnarounds
- 14 CFR § 137.41; Personnel; Pilot in command; demonstration of knowledge and skills.
- 14 CFR 137.31(b), Shoulder Harnesses
- 14 CFR 137.42, Fastening of safety belts and shoulder harnesses.
- 14 CFR 137.33(a), Carrying of certificate; certificate carried on the aircraft
- 14 C.F.R. 137.33(b) Registration and airworthiness certificates available

A. 14 C.F.R. §§ 137.19(e)(2)(ii), (iii), and (v), Certification requirements

Demonstration of the skills described in those paragraphs is not needed because they are not applicable to the operation of the UAS during agricultural aircraft operations as described in the Petitioner's business plan and in this petition.

Mullineaux Enterprises, LLC training and the Part 107 certification program provides the PIC with the necessary skills to safely operate the UAS. Mullineaux Enterprises, LLC is not

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requesting exemption from the skill requirements of § 137.19(e)(2) as required for certification as an agricultural aircraft operator under 14 CFR part 137.

B. 14 CFR §137.41; Personnel; Pilot in command; demonstration of knowledge and skills.

Because of the relief requested to § 137.19(e)(2)(ii), (iii), and (v), the Petitioner is requesting relief from those portions of the associated knowledge and skill test requirements of §137.41(c). Mullineaux Enterprises, LLC offers its own knowledge and skill test requirements that are a combination of reviewing the tested material of Part 107 and the necessary material that applies to its planned operations from Part 61.

C. 14 CFR 137.31(b), Shoulder Harnesses

An exemption from the requirements of the use of a shoulder harness and a safety belt is warranted because the Petitioner will be operating an unmanned aircraft.

D. 14 CFR 137.42, Fastening of safety belts and shoulder harnesses

The relief requested and justification are identical between section 137.31(b) and 137.42. An exemption is requested for the pair.

E. 14 CFR 137.33(a), Carrying of certificate; certificate carried on the aircraft

The Petitioner requests relief from § 137.33(a), Carrying of certificate, which requires that a copy of the agricultural aircraft operator certificate be carried on the aircraft. The FAA has previously determined that relief from §§ 91.9(b)(2) and 91.203(a) and (b) for the carriage of the aircraft flight manual and aircraft registration onboard the aircraft is not necessary. The documents will be kept in an accessible location to the PIC.

F. 14 CFR 137.33(b) Registration and airworthiness certificates available

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As explained above, the Petitioner's aircraft will not have an airworthiness certificate as it is a UAS operated pursuant to Part 107. The Petitioner will keep registration certificates available for inspection.

OPERATING DOCUMENTS

The Petitioner is providing the following information along with its petition to support its request for an exemption, which includes proprietary and/or confidential supporting documents:

- 1) Mullineaux Enterprises, LLC training program;
- 2) Mullineaux Enterprises, LLC business plan

Documents 1 and 2 above are hereinafter collectively referred to as the operating documents and will be provided after receiving a docket number.

CONCLUSION

The Petitioner hereby requests exemptions from the regulatory provisions listed above.

As mentioned, granting the exemption will not affect safety because the exemption will provide a level of safety equal to the existing rules.

Please do not hesitate to contact me if you have any questions at (240) 405-6135 or email mullineauxenterprisesllc@gmail.com.

Thank you!

Emma J. Mullineaux

CEO, Mullineaux Enterprises, LLC